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Claims

1. A method for cable preparation, comprising a first device (1) for cable preparation and at least one second device (2) for cable preparation or an additional device (2a), the first device (1a) for cable preparation having a first program control (3) with a first program, wherein a second program control (4) with a second program is coordinated with the second device (2) for cable preparation or with the additional device (2a), wherein the second device (2) for cable preparation or the additional device (2a) is connected to the first device (1) for cable preparation via a data transfer unit (5) and wherein the second program is designed in such a way that it accepts data of the first program via the data transfer unit (5) and generates therefrom control data by means of which it controls the second device for cable preparation (2) during operation, preferably at least a part of these control data and/or other data from the second program control (4) being fed back via the data transfer unit (5) to the first program control (3).

2. The method as claimed in claim 1, a stacking, coiling or unwinding device, on a cable preparation machine (1a) having at least one cable feed unit (22) and at least one cable preparation unit, being chosen as additional device (2a), and the cable to be prepared being displaced in at least one cable feed direction (23), the first process data (measure and/or control and/or cable data) relevant to the feed and/or specific to the cable being made available from the first program control (3) on the data transfer unit (5) before and/or during cable preparation or during cable feed and being polled by the second program control (4a) in order then, with the knowledge of these first control data and as a function of specifiable and/or measured second control data which are relevant to the result and relate to the intended or measured results of the additional device (2a), performs a process calculation and as a result defines third control data and these third control data being used for actuating the additional device (2a).

3. The method as claimed in claim 1 or 2, wherein a third program control (5a), for example a control logic system or a computer and/or an interface (5b), which in particular is in the form of a FIELD BUS, is chosen as the data transfer unit.

4. The method as claimed in claim 2 or 3, wherein result- or feed-relevant data from the process calculation or from other data sources (6) - fed into the second program control (4) - are fed back from the second program control (4) to the first program control (3).

5. The method for preparing a cable in a program-controlled cable preparation machine (1) and for prior preparation and/or parallel and/or subsequent further processing in an additional device (2a), as claimed in any of claims 2 to 4, wherein the second program controls (4a) are integrated in the additional device (2a), and wherein at least one program each is coordinated with them, and wherein the program is programmed in such a way that, depending on the program steps in the first program control (3), it delivers the feed-relevant values and/or cable data and/or processing data of said program control to the data transfer unit (5) and intervenes there and performs a program-controlled preliminary and/or parallel and/or further processing procedure in the additional device (2a), the program polling measured data of at least one sensor (7) which measures at least one parameter of the current geometry or position of the cable and converts these measured data as second process data, depending on the first process data, into the third process data.

6. The method as claimed in any of the preceding claims, wherein the additional device is in the form of at least one of the following devices and the preliminary and/or parallel and/or further processing is effected in at least one processing step typical of this device:

a) coiling device (2a) having a coiling pan or coiling plate (8a),

b) wire stacker (cable stacker),

c) prefeeder (cable unwinding unit),

d) cable marking device,

e) device for cable end preparation, comprising operations, such as, for example, in particular: twisting, fluxing, tin-plating, soldering, welding, crimping, pressing-on of contacts or sleeves, mounting of seals, plug housings, etc.,

f) device for cable layer preparation, in particular comprising mechanical or thermal tools or the like,

g) cable transport device,

h) binding device.

7. The method as claimed in claim 6, wherein the cable in the coiling device (2a) is gripped by a clamping device (9) connected to the coiling device and is clamped under program control, preferably until the coiling process has ended, the coiling device (2a) performing acceleration and rotary movements in the feed directions (23) and in opposite directions to the feed directions for the cable during processing, by the program-controlled drive of said coiling device, so that a programmable tensile load is produced within a defined tension range during the entire coiling process, with avoidance of the direct measurement of this tension, or the coiling device (2a) performing geometrically defined, tension-free laying of at least one cable end and preferably of all cable windings of the coil during processing, by means of the program-controlled drive of said coiling device.

8. The method as claimed in any of the preceding claims, wherein, before and/or in the course of preparation and coiling, the drive values, in particular the feed values, of the cable preparation machine, as first process data, influence the corresponding feed values of the coiling device (2a) via the third process data with a knowledge of the second process data which comprise in particular the current coiling diameter, and thus to achieve a cable tension set by the programming, within a limited tension range or tension-free laying, preferably without measuring the tension itself.

9. The method as claimed in any of the preceding claims, wherein the rear end of a coiled cable is left or positioned in a cable feed arm (10) at the end of the coiling process, and/or wherein, at the end of the coiling process, the coiling pan or the coiling plate (8) is rotated into a specific position so that at least one of the ends of the cable comes to rest in a specific, preprogrammable position.

10. A device comprising at least one first device (1) for cable preparation and at least one second device (2) for cable preparation, having a data transfer unit (5) between the two devices (1, 2) and a first program control (3) which is coordinated with the first device (1) for cable preparation, wherein a second program control (4) is coordinated with the second device (2) for cable preparation, which program control (4) is equipped with a program which, during operation, accepts data relevant to cable preparation from the first program control (3) via the data transfer unit (5) and converts said data into control data for the second device (2) for cable preparation.

11. The device as claimed in claim 10, wherein the first program control (3) and/or the second program control (4) and/or the data transfer unit (5) is connected to at least one data source (6) and/or to at least one sensor (7) which is suitable for influencing the data relevant to cable preparation and/or the control data, and/or wherein there is a feedback from the second program control (4) to the first program control (3), preferably via the data transfer unit (5), and/or wherein the data transfer unit is in the form of an interface (5b), in particular in the form of a FIELD BUS, or in the form of a third program control (5a), in particular in the form of a computer.

12. A device for cable preparation comprising a program control (3, 4), wherein the program control (3, 4) has an interface (5b) - preferably in the form of a FIELD BUS - and, during operation, data relevant to feed and/or to cable preparation are made accessible at said interface.

13. A device for carrying out a method as claimed in any of claims 1-9, comprising a first cable preparation machine (1a) having a first program control (3) and at least one additional device (2a), wherein a data transfer unit (5b) for transferring specific first process data relevant to feed or to cable preparation is coordinated with the first program control, wherein a second program control (4a) is coordinated with at least one of the additional devices (2a) and can be connected at a first input to the data transfer unit (5b), wherein the second program control (4a) is preferably housed in the additional device (2a) and provides second process data, wherein, to supplement the second process data, said second program control (4a) is optionally connected at a second input to a data input

unit (6a) and/or to at least one sensor (7), and wherein the second program control (4a) contains a program which makes it possible to combine the first process data with the second process data to give third process data, the second program control (4a) being connected on the output side to a control (11) for the additional device (2a) or for the additional devices (2a) and, during operation, provides the third process data to the control (11) as control data.

14. The device as claimed in claim 13, in particular having a coiling device (2a) as the additional device and at least one cable feed (10), at least one drive and preferably at least one clamping device (9) for a cable end, wherein the second program control (4a) is connected on the input side to at least one sensor (7) for second process data which, in the operating state, measures at least one geometric value of the coil and/or at least one position value or geometric value of the cable, and wherein the program comprises a computational instruction for calculating theoretical cable feed velocities and/or theoretical coiling speeds as fourth process data depending on speed or velocity and radial distance to the axis (12) of rotation or speed and coil circumference, the computational instruction preferably making these theoretical feed velocities or speeds comparable, as fourth process data, with the corresponding first and/or second process data, in order to determine the third process data therefrom, for example for speed adaptation.

15. A coiling device for or in a device as claimed in claim 14, wherein the coiling device (2a) comprises over a controlled clamping device (9) for at least one cable end and/or mandrels (13) which determine the internal diameter of the coil and can be displaced radially relative to the axis of the coil and/or optionally in the axial direction of the coil during the removal process.

16. The coiling device for or in a device as claimed in claim 14 or as claimed in claim 15, wherein the coiling device (2a) has a coiling pan and/or a coiling plate (8), and/or wherein the coiling pan or the coiling plate (8) has a base (14) which can be displaced relative to the mandrels (13) in the axial direction of the coil, or wherein an automatic delivery device for the coil is provided which makes it possible to remove the coil in a geometrically defined or undefined manner.

17. The coiling device as claimed in any of the preceding claims, wherein the coiling pan or the coiling plate (8) has, on its base (14), removable spacers (15) which keep the coil a distance away from the base (14) so that the coil can be gripped from underneath or from behind by an operator and/or by a removal device and/or by a binding device.

18. The coiling device as claimed in any of the preceding claims, wherein at least one cable binding device (38) is coordinated with the coiling device (2a), which cable binding device (38) performs a binding process on the coil during operation in at least one position - preferably defined under program control.

19. The coiling device as claimed in any of the preceding claims, wherein the sensor (7) is in the form of a coil diameter sensor and/or in the form of a cable position sensor and/or in the form of a cable geometry sensor, preferably in the form of a mechanical or optoelectronic sensor.

20. The coiling device as claimed in any of the preceding claims, wherein two adjacent coiling pans or coiling plates (8a, 8b) are provided, in which coils can be formed alternately under process control, a common cable diverter (16) which has two separate cable feed channels (17a, 17b) which are independent of one another and can be positioned, alternately and under program control, opposite a cable exit (18) of the cable preparation machine (1a) being mounted upstream of the two coiling pans or coiling plates (8a, 8b), and/or wherein a motor-controlled cable guide arm (19) which, during operation, makes it possible to position the cable relative to the coiling pan or to the coiling plate (8) with the aid of the third process data under program control is coordinated with the or each coiling pan or each coiling plate (8a, 8b), and/or wherein a common cover (20) is coordinated with the two coiling devices (8), which cover (20) enables rotation or coiling operation of only the covered coiling device (8a) with control by the safety circuit.

21. The coiling device as claimed in claim 20, wherein the cable diverter (16) is equipped with at least one third cable guide duct for not guiding a cable to the coiling pan or to the coiling plate (8), and/or wherein the cable diverter (16) is removable, preferably under motor power or manually.

22. The coiling device as claimed in any of the preceding claims, wherein a cable feed arm (10) on a cable guide arm (19) is coordinated with each coiling pan or with each coiling plate (8), which cable feed arm (10) is pivotable about an axis (21) and is geometrically related to a sensor connected to the second program control (4a), so that it makes it possible, under program control, to guide a cable during coiling and/or to monitor coil formation and/or the cable.

23. The coiling device as claimed in any of claims 13-19 or 21-22, which comprises a cable diverter (16) and at least two cable guide ducts, of which at least one is provided for feeding a cable to the coiling device and at least one further one is provided for not feeding a cable to the coiling device, or wherein at least one cable diverter (16) is removable - preferably under motor power - so that fed cables are not transported into the coiling pan or onto the coiling plate (8).

24. The coiling device as claimed in any of the preceding claims, wherein a position detection sensor (7) is arranged on the coiling pan or on the coiling plate (8), or wherein the drive of the coiling pan or of the coiling plate (8) is controlled in such a way that the rotary position of the coiling pan or of the coiling plate (8) can be fixed for cable feed, preferably the second program control (4a) comprising a sequence which makes it possible to lay at least one of the cable ends of the coil in a defined position for removal or binding purposes, preferably by a or by the cable guide arm (19) and/or by rotary positioning of the coiling pan or of the coiling plate (8).

25. The coiling device as claimed in any of the preceding claims, wherein the program comprises tables and/or computational instructions with data for startup ramp controls, which can be used for optimal control of the coiling pan drive or coiling plate drive.

26. The coiling device as claimed in any of the preceding claims, wherein the coiling pan drive or coiling plate drive comprises brakes and/or is formed in such a way that it can be operated in a braking mode, and/or wherein said drive is equipped with a power consumption sensor which, during operation, monitors the power consumption of the drive and feeds back the values for control purposes to the second program control.

27. The coiling device as claimed in any of the preceding claims, wherein the additional device (2a) is upstream or downstream of the cable preparation machine (1a), or wherein the additional device is connected parallel to the cable preparation machine.

28. A system for the preparation, insulation stripping and further processing of a cable, at least one second device for cable preparation being upstream of and/or a device (2a) for further processing of cables being downstream of and/or connected parallel to, a first cable insulation stripping device (1a), wherein each of the devices is provided with a separate program control (3, 4) having in each case a separate program, of which the first program control (3) of the cable insulation stripping device (1a) provides, in the operating state, first process data specific to insulation stripping and/or to the cable and/or to the feed via at least one data transfer unit (5) in each case, to the other second program control (4), the program of the second program controls (4a) comprising at least one computational instruction which makes it possible to combine the first process data with further third process data specific to preparation or to further processing, in order to derive therefrom control-specific process data for the drives of the preparation device or further processing device (2a).